OVERVIEW

The Data Acquisition System GM is a data logger that excels in versatility and expandability. The main unit includes on-board memory for data acquisition and also supports SD cards for external storage. The system consists of a Data Acquisition Module (GM10), Power Supply Module (GM90PS), and Module Base (GM90MB), which is used to mount a variety of modules.

SMARTDAC+ GM utilizes the same modules as the GX/GP series of SMARTDAC+.

- **High expandability and maintainability**: Employs YOKOGAWA's original block structure, making it easy to rearrange the combination of required modules. The structure also excels in maintainability because even after installation, every module can be removed separately.

- **Multichannel measurement**: Measures up to 420 analog input channels on the GM10-2 and up to 100 channels even on the GM10-1.

- **Flexible system configuration**: A wide variety of systems, such as multichannel measurement from 10 to 420 channels or data acquisition through communication, can be configured.

- **High environmental tolerance**: The guaranteed operating temperature range of -20°C to 60°C allows more freedom in where the system can be installed.

- **Mounting**: Not only can the system be installed on a desktop, it can also be mounted on DIN rails or a wall.

- **Less wiring through distribution**: Installation of sub units away from the main unit makes measurement possible without connecting sensor signal wires over a long distance.

- **Long-term recording and saving**: Large internal memory (500 MB on the GM10-1 and 1.2 GB on the GM10-2) allows long-term recording and saving.

- **Secure saving of recording data**: An SD card (SD/SDHC) up to 32 GB (1 GB included) can be used for the external storage medium. And the FTP client function can be used to provide data redundancy using a file server.

- **Rich I/O interface**: Seven types of I/O modules are available: analog input, analog output, digital input, digital output, pulse input and PID control. DCV (DC voltage), TC (thermocouple), RTD (resistance temperature detector), DI (contact or TTL level voltage), mA (DC current) can be assigned to each channel as input signals.

- **Web server function**: Various settings can be configured online from a Web browser, without using a dedicated software application. Moreover, measured data can be monitored in real time.

- **High withstand voltage performance**: Safe measurement up to withstand voltage of 600 V between input terminal and ground is possible by using a high withstand voltage analog input module.

- **High-speed measurement**: Measurement at the shortest interval of 1 ms is possible by using a high-speed analog input module.

- **Dual interval measurement**: Measurement can be performed by setting two different scan intervals.

- **Simple settings**: The standard USB port makes it easy to connect with the PC.

- **Supports 21 CFR Part 11**: GM supports the USA FDA's Title 21 CFR Part 11 regulation by advanced security function (/AS optional).

- **PID control function**: PID control on up to 20 loops is possible by installing a PID control module.

- **Program control function (/PG option)**: Program control of up to 99 patterns is possible by using a PID control module and program control function. In addition, up to 32 time event and 32 PV events can be used.

*For details on the PID control module, PID control function, and program control function (/PG), see the GS90UTPID Control Module General Specifications (GS04L53B01-31EN).

- **Math function (/MT option)**: Various calculations are possible. The report function enables creation of hourly, daily, and monthly reports and other types of data. Logic computation outputs results of computation as 0s or 1s to internal switches and DO channels.

- **Extensive network functions**: The standard Ethernet interface allows network features such as various e-mail notifications and FTP file transfer. In addition, Modbus/TCP, Modbus/RTU (/C3), EtherNet/IP (/E1), and CC-Link family SLMP communication (/E4) are supported.

- **Universal Viewer software**: A free software application is available for displaying and printing waveforms of measured data on a PC.

The contents of this general specifications correspond to the GM with release number 4 and style number 2.

- Release number: firmware ID number (GM10)
- Style number: hardware ID number (GM90PS)
**Actual values underlying accurate measurements**

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Measuring accuracy*1 (typical value)*2</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCV 20 mV</td>
<td>± (0.01% of rdg + 5 μV)</td>
</tr>
<tr>
<td>DCV 60 mV</td>
<td>± (0.01% of rdg + 5 μV)</td>
</tr>
<tr>
<td>6V (1-5V)</td>
<td>± (0.01% of rdg + 2 mV)</td>
</tr>
<tr>
<td>TC*3 R, S</td>
<td>± 1.1°C</td>
</tr>
<tr>
<td>B</td>
<td>± 1.5°C</td>
</tr>
<tr>
<td>K (-200.0 to 1370.0°C)</td>
<td>± (0.01% of rdg +0.2°C for 0.0 to 1370.0°C; ± (0.15% of rdg +0.2°C) for -200.0 to 0.0°C)</td>
</tr>
<tr>
<td>K (-200.0 to 500.0°C)</td>
<td>± 0.2°C for 0.0 to 500.0°C; ± (0.15% of rdg +0.2°C) for -200.0 to 0.0°C</td>
</tr>
<tr>
<td>J</td>
<td>± 0.2°C for 0.0 to 1100.0 °C; ± (0.10% of rdg + 0.2 °C) for -200.0 to 0.0 °C</td>
</tr>
<tr>
<td>T</td>
<td>± 0.2°C for 0.0 to 400.0 °C; ± (0.10% of rdg + 0.2 °C) for -200.0 to 0.0 °C</td>
</tr>
<tr>
<td>N</td>
<td>± (0.01% of rdg + 0.2°C) for 0.0 to 1300.0 °C; ± (0.22% of rdg + 0.2°C) for -200.0 to 0.0 °C</td>
</tr>
<tr>
<td>RTD Pt100</td>
<td>(−200.0 to 850.0°C) ± (0.02% of rdg + 0.2°C)</td>
</tr>
<tr>
<td>Pt100 (high resolution) (-150.00 to 150.00°C)</td>
<td>± (0.02% of rdg + 0.16°C)</td>
</tr>
</tbody>
</table>

rdg: Reading value

*1 These values have been calculated from the accuracy testing data at the time of shipment of the instrument from the factory. Applies to GX90XA-10-U2, A/D integration time 16.67 ms or more. General operating conditions: 23±2 °C, 55±10% RH, supply voltage 90–132, 180–264 V AC, power frequency within 50/60 Hz ±1%, warm-up of 30 minutes or more, no vibrations or other hindrances to performance.

*2 For the measuring accuracy (guaranteed), see the module’s general specifications (GS 04L55B01-01EN).

*3 These values do not include the reference junction compensation accuracy.

**CONFIGURATION**

SMARTDAC+ GM handles a wide variety of applications through the combination of various modules.

The unit that includes GM10 (Data Acquisition Module) is called the main unit. A unit connected to the main unit via GX90EX (expansion module) is called a sub unit. Modules in a unit can be connected by installing a GM90MB (Module Base).

**Unit Types**

**Main Unit (Single Unit)**

A unit consisting of a GM10 and a GM90PS. Up to 10 I/O modules* can be connected to a unit.

**Main Unit (Multi Unit)**

A unit consisting of a GM10, a GM90PS and a GX90EX. Up to six I/O modules can be connected to a unit. Up to six sub units can be connected via the GX90EX.

**Sub Unit**

A unit consisting of a GM90PS and a GX90EX. Up to six I/O modules can be connected to a unit. The main unit and sub units are connected directly using LAN cables. The maximum connection distance between two units is 100 m. It can also be used as an expandable I/O for the GX/GP paperless recorder.

* See “Restrictions and Cautions” on page 26.

**Module Types**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM10</td>
<td>Data Acquisition Module for SMARTDAC+ GM</td>
</tr>
<tr>
<td>GM90PS</td>
<td>Power Supply Module for SMARTDAC+ GM</td>
</tr>
<tr>
<td>GX90EX</td>
<td>Expansion module</td>
</tr>
<tr>
<td>GM90MB</td>
<td>Module Base</td>
</tr>
</tbody>
</table>

* The firmware version of GX90EX that can be used on the SMARTDAC+ GM must be R1.02.01 or later.

For the detailed specifications of the expansion module, see the following general specifications.

Material No.: GS 04L55B00-01EN
I/O Modules

Input/output modules may need to have their firmware updated.

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GX90YA</td>
<td>Analog output module (number of outputs: 4) A module that can transmit 4 to 20 mA DC or 0 to 20 mA DC signals. Output update interval: 100/200/500 ms, 1/2/5 s Power consumption: 3.0 W</td>
</tr>
<tr>
<td>GX90YD</td>
<td>Digital output module (number of outputs: 6) A module that can transmit relay contact (c contact) signals. Scan interval: 100/200/500 ms, 1/2/5 s Power consumption: 1.4 W</td>
</tr>
<tr>
<td>GX90WD</td>
<td>Digital I/O module (number of inputs: 8, number of outputs: 6) A module that can receive open collector or voltage-free contact signals and transmit relay contact (c contact) signals. Scan interval: 100/200/500 ms, 1/2/5 s Power consumption: 1.6 W</td>
</tr>
<tr>
<td>GX90XP</td>
<td>Pulse input module (number of inputs: 10) A module that can receive open collector, voltage-free contact, or 5 V logic signals. Scan interval: 100/200/500 ms, 1/2/5 s Power consumption: 0.9 W</td>
</tr>
<tr>
<td>GX90UT</td>
<td>PID control module (Number of inputs / outputs: universal input 2, current pulse or voltage pulse output 2, DI 8, DO 8) This module can perform PID control on up to 2 loops. It supports the following control modes: single loop, cascade, and loop control with PV switching. Control interval: 100/200 ms Power consumption: 2.8 W</td>
</tr>
</tbody>
</table>

For the detailed specifications of the I/O modules, see the following general specifications.
Material No.: GS 04L53B01-01EN
For the detailed specifications of the PID control module, see the following general specifications.
Material No.: GS 04L53B01-31EN

Material No.: GS 04L53B01-31EN

Continued on the following table
• System Configuration
SMARTDAC+ GM supports both standalone operation and data acquisition using a PC.

Restrictions on module connection
* See "Restrictions and Cautions" on page 26.

Single Unit System
A system configured with only a main unit.
  Use as a stand-alone type

Use by connecting a PC

Multi Unit System
A system configured with a main unit connected to sub units*.
  * The GX60 expandable I/O can also be used.
  Note: The main unit and sub units are connected directly using LAN cables. Hubs and repeaters cannot be used.
  • Up to six sub units can be connected to a main unit. Each unit can connect up to six modules.
  • For analog input, up to 420 channels (GM10-2) and up to 100 channels (GM10-1) can be measured.

Use as a stand-alone type
SMARTDAC+ GM COMMON SPECIFICATIONS

- **Compliant Standards**
  - **CSA:** CAN/CSA-C22.2 No. 61010-1, overvoltage category II or I', pollution degree 2', KC mark: Electromagnetic wave interference Korea
  - **UL:** UL 61010-1, UL 61010-2-030 (CSA NRTL/C) UL 61010-2-201(CSA NRTL/C)'4
  - **CE/EMC directives:** EN61326-1 compliance, Class A Table 2 EN61000-3-2 compliance EN61000-3-3 compliance EN55011 compliance EN55011 Class A Table 2 EN61000-3-3 compliance EN61000-3-2 compliance
  - **CE/Low voltage directive:** EN61010-1, EN 61010-2-030 Overvoltage category II or I', pollution degree 2' Measurement category II'3, EN62311 compliance /C8 option
  - **/C8 option**
    - R&TTE directive: HEALTH&SAFETY EN61010-1 compliance EN61010-2-030 compliance Overvoltage category II or I', pollution degree 2' Measurement category II'3, EN62311 compliance EMC
    - EN301 489-1 compliance EN301 489-17 compliance EN61326-1 compliance SPECTRUM
    - EN300 328 compliance Australia, New Zealand EMC standard (RCM): EN55011 compliance, Class A Group 1
  - **Wireless communication standards of Australia and New Zealand (RCM) (optional code /C8):** AS/NZS4268, AS/NZS2772.2
  - **KC mark:** Electromagnetic wave interference prevention standard, electromagnetic wave protection standard compliance
  - **Wireless module certification and the like:** FCC Approval, IC Approval, Japanese Radio Law Korea Certification (Radio Wave Act), China Certification (Radio Wave Act)

*1 Overvoltage category: Describes a number which defines a transient overvoltage condition. Implies the regulation for impulse withstand voltage. Applies to electrical equipment which is supplied from the fixed installation like a distribution board.
  - I: Applied to power supply voltage code 1 (100-240 V AC)
  - II: Applied to power supply voltage code 2 (12-28 V DC)

*2 Pollution degree 2: Describes the degree to which a solid, liquid, or gas which deteriorates dielectric strength or surface resistivity is adhering. "2" applies to normal indoor atmosphere. Normally, only non-conductive pollution occurs.

*3 Measurement category: Depends on the specification of each modules

<table>
<thead>
<tr>
<th>Category</th>
<th>Measurement category</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>CAT II</td>
<td>Available in the testing and measuring circuits directly connected to a usage location (receptacle or the like) of a low-voltage main power supply facility.</td>
<td>Appliances, portable equipment, etc.</td>
</tr>
<tr>
<td>III</td>
<td>CAT III</td>
<td>Available in the testing and measuring circuits connected to a power distribution portion of a low-voltage main power supply facility.</td>
<td>Distribution board, circuit breaker, etc.</td>
</tr>
<tr>
<td>IV</td>
<td>CAT IV</td>
<td>Available in the testing and measuring circuits connected to a power source of a low-voltage main power supply facility.</td>
<td>Overhead wire, cable systems, etc.</td>
</tr>
</tbody>
</table>

*4 This product is designed as open equipment under the relevant standard, install it as follows:
  - Install the GM unit / GX60 in a panel with a door.
  - The instrumentation panel or panel used for support must comply with CSA/UL/EN 61010-2-201 or must be at least IP1X (degrees of protection) and at least IK09.

- **WEEE Directive:** Compliant
- The /C8 option does not support the standard.

- **Normal Operating Conditions**
  - **Rated supply voltage:** 100 to 240 V AC (AC power supply) or 12 to 28 V DC (DC power supply)
  - **Allowable supply voltage:** 90 to 264 V AC (AC power supply) or 10 to 32 V DC (DC power supply)
  - **Power frequency (AC power supply):** 50 Hz ±2 %, 60 Hz ±2 %
  - **Power consumption:**
    | Supply voltage | Normal operation* | Maximum |
    |----------------|-------------------|---------|
    | 100 V AC       | 25 VA             | 45 VA   |
    | 240 V AC       | 35 VA             | 60 VA   |
    | 12 V DC        | 15 VA             | 24 VA   |

  - * When 10 analog input modules are connected

- **Ambient temperature:** -20 to 60 °C
  - -20 to 50 °C in the following cases:
    - When a GX90YD is used
    - When a GX90WD is used
    - When a GX90XA-T1 (electromagnetic relay type) is used
    - When a GX90YA is used
    - When a GX90UT is used
    - On a GM10 with the /C8 option

- **Ambient humidity:** 20 to 85 %RH
  - (no condensation)
- **Magnetic field:** 400 A/m or less (DC and 50/60 Hz)
- **Vibration:** 5 ≤ f < 8.4 Hz amplitude 3.5 mm (peak) 8.4 ≤ f ≤ 160 Hz acceleration 9.8 m/s² or less
- **Shock:** Power supply ON, 98 m/s² or less, 11 ms (excluding GX90YD and GX90WD) Power supply OFF, 500 m/s² or less, approx. 10 ms 6 directions (±X, ±Y, ±Z), 3 times in each direction

All Rights Reserved. Copyright © 2014, Yokogawa Electric Corporation GS 04L55B01-01EN Oct 17, 2018-00
Mounting position: Left and right horizontal, front and back horizontal
Altitude: 2000 m or less
Installation location: Indoors
Warm-up time: At least 30 minutes after power on

Transport and Storage Conditions
Ambient temperature: −25 to 70 °C
Ambient humidity: 5 to 95 %RH (no condensation)
Vibration: 10 to 60 Hz, 4.9 m/s² maximum
Shock: 392 m/s² maximum (in packaged condition)

Construction
Mounting: Wall mount, DIN rail (panel storage, rack), desktop
Material: No stacking
Material: Polycarbonate

Functional Specifications
Measuring Function
Number of connectable modules and number of I/O channels:

<table>
<thead>
<tr>
<th>Modules</th>
<th>I/O channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM10-1</td>
<td>Up to 10</td>
</tr>
<tr>
<td></td>
<td>Up to 100</td>
</tr>
<tr>
<td>GM10-2</td>
<td>Up to 42</td>
</tr>
<tr>
<td></td>
<td>Up to 500</td>
</tr>
<tr>
<td></td>
<td>(up to 420 if AI only)</td>
</tr>
</tbody>
</table>

Measurement mode:
Normal, High speed, Dual interval
Normal: A mode in which the shortest measurement interval is 100 ms
Number of scan groups: 1
File type: Event data, display data
Data format: Binary, text
Scan interval: Fastest 100 ms
Compatible modules: All modules
High speed: A mode in which the shortest measurement interval is 1 ms
Number of scan groups: 1
File type: Event data only
Data format: Binary only
Scan interval: Fastest 1 ms
Compatible modules:*  
High-speed AI (GX90XA-4-H0)  
* A single DI (GX90XD) or DIO (GX90WD) can be connected for remote input. Measurement and recording are not possible.

Dual interval: A mode in which measurement is possible by setting different scan intervals on the two scan groups.

Number of scan groups: 2

File type: Event data only

Data format: Binary only

Scan interval:

<table>
<thead>
<tr>
<th>Model</th>
<th>Scan group 1</th>
<th>Scan group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM10-1</td>
<td>5 ms</td>
<td>100 ms</td>
</tr>
<tr>
<td>GM10-2</td>
<td>1 ms</td>
<td>100 ms</td>
</tr>
</tbody>
</table>

Master scan interval:

- Scan group 1 or scan group 2
- Master scan interval is used for the following:
  - Math function's scan interval, communication channel function's scan interval, manual sampling function's detection timing, logic math interval, instantaneous values included in e-mails
  - Compatible modules: Modules other than the PID control module
    - Scan interval: 1 ms / 2 ms / 5 ms / 10 ms / 20 ms / 50 ms / 100 ms / 200 ms / 500 ms / 1 s / 2 s / 5 s
    - Note: Some intervals will be unavailable depending on the system configuration and modules.
      - Scan intervals shorter than 1 s cannot be specified on electromagnetic relay type (type suffix code: -T1) analog input modules.
      - Scan intervals shorter than 500 ms cannot be specified on low withstand voltage relay type (type suffix code: -L1) analog input modules.
      - Scan interval shorter than 100 ms can only be specified when the measurement mode is set to High speed or Dual interval.

Module connection limitations:

See “Restrictions and Cautions” on page 27.

**Channel Specifications**

Operations such as measurement, computation, and recording are performed on channels.

- Channel name: A channel name is expressed with a 4-digit number. Channel names are specific to the system, so they cannot be changed. By setting tags or tag numbers to the channels, you can use any names you like.

<table>
<thead>
<tr>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>—— Channel name</th>
</tr>
</thead>
</table>

- **Channel number**
  - Analog input: 01 to 10
  - Analog output: 01 to 04
  - Digital input: 01 to 16
  - Digital output: 01 to 06
  - Digital I/O:
    - Digital input: 01 to 08
    - Digital output: 09 to 14
  - Pulse input: 01 to 10
  - PID control, I/O: 01 to 26

- **Slot number:** 0 to 9

- **Unit number**
  - Main unit: 0
  - Sub unit: 1 to 6

**Display Function**

Real-time data monitoring is possible using a Web browser.

- Number of groups: GM10-1: 50, GM10-2: 60
- Number of channels that can be assigned to each group: 20
- Display types: Trend, digital, bar graph, horizontal bar graph, overview, alarm summary, message summary, DO channel status, internal switch status, Modbus master status, Modbus client status, WT client status, SLMP client status, memory data list, report data list, manual sampled data list, various error logs, network information, system information.

Display update interval: Minimum 1 second

**Data Saving Function**

Data is recorded to internal memory and external storage medium. When the system recovers from a power failure, the operation that was being performed before the power failure is resumed.

- Internal memory: Temporarily saves various types of data.
- External storage medium:
  - Medium: SD card (SD/SDHC)
  - Size: 1 to 32 GB (1 GB included)
  - Format: FAT32 or FAT16

Data saving to the external storage medium:

- Select whether to save automatically or when a medium is inserted for event data, display data, manual sampled data, and report data.
- Auto save: Automatically saves to the internal memory when a data files is created.
- Save when a medium is inserted:
  - Saves unsaved data files when an external storage medium is inserted.

- Data type:
  - **Data type** | **Saved content**
  - Display data | Maximum and minimum values per recording interval
  - Event data | Instantaneous values at recording intervals
  - Alarm summary data | Summary of warnings
  - Manual sampled data | Instantaneous values at a user specified time
  - Setup data | GM10 and I/O module settings
  - Report data (MT option) | Report at each scheduled time of report

- **Event data**
  - Target: Measurement (I/O module) / math (MT) / communication (MC) channels, alarm summary, message summary
  - Recording interval: 1 ms / 2 ms / 5 ms / 10 ms / 20 ms / 50 ms / 100 ms / 200 ms / 500 ms / 1 s / 2 s / 5 s / 10 s / 15 s / 20 s / 30 s / 1 min / 2 min / 5 min / 10 min / 15 min / 20 min / 30 min selectable
  - Note: Some intervals will be unavailable depending on the scan interval and number of channels.

Number of channels: Determined by the scan interval and recording data type.
### Measurement mode: Normal

<table>
<thead>
<tr>
<th>GM10-1</th>
<th>Recording interval</th>
<th>Number of channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 ms</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>200 ms</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>500 ms or longer</td>
<td>500</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GM10-2</th>
<th>Recording interval</th>
<th>Number of channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 ms</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>200 ms</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>500 ms</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>1 s or longer</td>
<td>1000</td>
<td></td>
</tr>
</tbody>
</table>

### Measurement mode: High speed

<table>
<thead>
<tr>
<th>GM10-1</th>
<th>GM10-2</th>
<th>Recording interval</th>
<th>Number of channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ms</td>
<td>---</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2 ms</td>
<td>---</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5 ms</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 ms</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 ms</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 ms</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 ms</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200 ms</td>
<td>200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>500 ms</td>
<td>500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 s or longer</td>
<td>500</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Measurement mode: Dual interval

<table>
<thead>
<tr>
<th>GM10-1</th>
<th>GM10-2</th>
<th>Recording interval</th>
<th>Number of channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ms</td>
<td>---</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2 ms</td>
<td>---</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5 ms</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 ms</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 ms</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 ms</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 ms</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200 ms</td>
<td>200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>500 ms</td>
<td>500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 s or longer</td>
<td>500</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

### Data size (binary):
- Analog input data: 6 bytes/ch.
- Analog output data: 6 bytes/ch.
- Digital I/O data: 2 bytes/ch.
- Math channel data: 6 bytes/ch.
- Communication channel data: 6 bytes/ch.

### File size (binary): Up to 18 MB

### Number of files (including display data) (internal memory)
- GM10-1: Up to 500
- GM10-2: Up to 1000

### Internal memory operation: FIFO (First In First Out)

---

### Display data file sample time (estimated)

#### GM10-1 (when recording interval is 1 s)

<table>
<thead>
<tr>
<th>I/O channels</th>
<th>Total sample time</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Approx. 29 days</td>
</tr>
<tr>
<td>100</td>
<td>Approx. 9 days</td>
</tr>
</tbody>
</table>

#### GM10-2 (when recording interval is 1 s)

<table>
<thead>
<tr>
<th>I/O channels</th>
<th>Total sample time</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Approx. 71 days</td>
</tr>
<tr>
<td>100</td>
<td>Approx. 23 days</td>
</tr>
<tr>
<td>300</td>
<td>Approx. 7 days</td>
</tr>
</tbody>
</table>

### Display data:
- Target: Measurement (I/O module)/math (MT)/communication (MC) channels, alarm summary, message summary

### Trend interval (/div) (recording interval):
- 5 s / 10 s / 15 s / 20 s / 30 s / 1 min / 2 min / 5 min / 10 min / 15 min / 20 min / 30 min

- Note: Some intervals will be unavailable depending on the scan interval and number of channels.

### Number of channels: Determined by the trend interval and recording data type

### GM10-1

#### Trend interval setting (/div)

<table>
<thead>
<tr>
<th>Recording interval</th>
<th>Number of channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 s</td>
<td>100 ms</td>
</tr>
<tr>
<td>10 s</td>
<td>200 ms</td>
</tr>
<tr>
<td>15 s or longer</td>
<td>500 ms or more</td>
</tr>
</tbody>
</table>

### GM10-2

#### Trend interval setting (/div)

<table>
<thead>
<tr>
<th>Recording interval</th>
<th>Number of channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 s</td>
<td>100 ms</td>
</tr>
<tr>
<td>10 s</td>
<td>200 ms</td>
</tr>
<tr>
<td>15 s or longer</td>
<td>500 ms or more</td>
</tr>
</tbody>
</table>

### Data size (binary):
- Analog input data: 12 bytes/ch.
- Analog output data: 12 bytes/ch.
- Digital I/O data: 4 bytes/ch.
- Math channel data: 12 bytes/ch.
- Communication channel data: 12 bytes/ch.

### File size (binary): Up to 18 MB

### Number of files (including display data) (internal memory)
- GM10-1: Up to 500
- GM10-2: Up to 1000

### Internal memory operation: FIFO (First In First Out)

### Data format: Binary or text

- Selectable when saving to the external storage medium

### Display data file sample time (estimated)

#### GM10-1 (when recording interval is 1 min)

<table>
<thead>
<tr>
<th>I/O channels</th>
<th>Total sample time</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Approx. 914 days</td>
</tr>
<tr>
<td>100</td>
<td>Approx. 239 days</td>
</tr>
</tbody>
</table>

#### GM10-2 (when recording interval is 1 min)

<table>
<thead>
<tr>
<th>I/O channels</th>
<th>Total sample time</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Approx. 2184 days</td>
</tr>
<tr>
<td>100</td>
<td>Approx. 702 days</td>
</tr>
<tr>
<td>300</td>
<td>Approx. 239 days</td>
</tr>
</tbody>
</table>

### Alarm summary:
- Saved item: Alarm of each data item
- Maximum number of items saved to internal memory: 5000
Internal memory operation: FIFO (First In First Out)
Maximum number of items displayed on Web screen: Latest 1000
Save operation: Saves alarm information to internal memory when an alarm occurrence or release is detected
  * Alarm information is saved to the corresponding event or display data file.
Saved content: Target channel name (tag name), time of occurrence or release, warning type, etc.
Save operation methods: Web browser, communication command
  • Message summary:
    Description: Saves a summary of written messages
    Saved item: Message string
    Maximum number of items saved to internal memory: 1000
Internal memory operation:
  FIFO (First In First Out)
Maximum number of items displayed on Web screen: Latest 450
Save operation: Saves message information to internal memory when message writing operation is performed.
  * Message information is saved to the corresponding display or event data file.
Saved content: Message name, writing interval, user name, write group
  • Manual sampled data:
    Saved item: Measurement (I/O module)/math (/MT)/communication (/MC) channels
    Number of saved channels:
      GM10-1: Up to 50, GM10-2: Up to 100
Save operation methods: Web browser, communication command, event action
Maximum number of events saved to internal memory: 400
Internal memory operation: FIFO (First In First Out)
Auto saving to an external storage medium:
  Every time manual sampling is executed
Data format: Text format
  • Setup data
    Saved item: GM10 and I/O module settings (including setup data of modules connected via GX90EX)
    Saved events: Operation from a Web browser, communication command, event action, setting changes (when the advanced security function (/AS) is on)
Data format: Text format
  Binary format when the advanced security function (/AS) is on
  • Report data (/MT option):
    Saved item: Measurement (I/O module)/math/communication channels
    Select from average, maximum, minimum, sum, and instantaneous values
    Type: Hourly + daily, daily + weekly, daily + monthly
    User specified time (batch, day custom)
    Saved events: Timeout time of each report type
    Maximum number of events saved to internal memory: 800
Internal memory operation: FIFO (First In First Out)
Auto saving to an external storage medium:
  Save every time of the event
Data format: Test format
  • User data
    Saved item: Excel report template (/MT), PDF/print report template, SSL communication certificate (server certificate, trusted certificate), electronic signature certificate (/MT)
Recorded events: Operation from a Web browser, communication command

Message Write Function
Messages can be written to event data and display data.
  • Message type:
    Preset message: Writes preset text
    Free message: Writes text that you enter
    Auto message: Writes fixed text when power recovers after a power failure occurs during recording.
  • Preset message, free message:
    Number of displayable characters: Up to 32
    Displayable character types: Alphanumeric, Japanese, and Chinese characters
    Number of messages: Preset message: 100
    Free message: 10
    Free messages that you enter are also saved in setup files.

Write method: Operation from a Web browser, communication command, event action
Write destination: Specified event data or display data group or all groups
  • Auto message
    Displayed text: "Power-fail" + the time of failure occurrence
    Example: Power-fail 2014/01/06 09:49:21
    Write method: Writes a message when power recovers after a power failure occurs during recording.
    Whether or not to write is selectable.
    Write destination: All display data or event data groups

Alarm Function
  • Number of alarms: Up to four alarms (levels) for each measurement channel
  • Alarm type: High limit, low limit, difference high limit, difference low limit, high limit on rate-of-change, low limit on rate-of-change, delay high limit, and delay low limit
  • Alarm delay time: 1 s to 24 hours (for each channel)
  • Rate-of-change calculation interval of rate-of-change alarms: 1 to 32 times the scan interval (common to all channels)
  • Hysteresis: 0.0 to 5.0% of the span (for each alarm level)
  • Alarm output:
    DO output:
      DO operation: Energize/de-energize, hold/nonhold, AND/OR, reflash
    Internal switch output:
      Number of internal switches: 100
    Internal switch operation: AND/OR operation selectable
  • Status LED display operation: Select whether or not to hold the indication until an alarm acknowledge operation is performed
• Alarm no logging function: Possible to output only to the DO or internal switch when an alarm occurs (warning display and recording to the alarm summary are not performed)
• Alarm information: Displays a log of alarm occurrences on the alarm summary
• Reflash: The duration for which the reflash relays are deactivated can be set to 500 ms, 1 s, or 2 s.
• Individual alarm ACK function: Alarm display and relay output can be canceled on individual alarms.

Event Action Function
• Description: Execute a specified operation when a given event occurs.
• Number of settings: 50
  Events: Remote control input, etc.
  Timer: Number of timers: 12
  Match time timer: Number of timers: 12
  Action: Specify memory start/stop, alarm ACK, etc.

Control Event Action Function
See the GX90UT PID Control Module General Specifications (GS04L53B01-31EN).

Security Function
• Key lock function: All GM10 key operations
• Login function: Only registered users can operate the GM (Ethernet/serial (/IC3) /USB/ Bluetooth (/ C8) operation) (including Web browsers)
  System administrators and users: Up to 50
  Number of Authority of user: 10 levels

Manual Sampling Function
• Description: Measured value at a user specified time
• Target: Measurement (/I/O module)/math (/MT)/ communication (/MC) channels
• Number of recording channels:
  GM10-1: Up to 50
  GM10-2: Up to 100
• Maximum number of data values that the internal memory can store: 400
• Data format: Text

Report Function (/MT option)
• Description: Report at each scheduled time of report
• Target: Measurement (/I/O module)/math/ communication channels
• Number of report channels: 60
• Maximum number of data values that the internal memory can store: 800
• Data format: Text

Setup Function
• Description: GM10 and I/O module setup
• Setup method: Web browser, communication commands, Hardware Configurator
• Output/read destination (for saving/loading): External storage medium

Clock Function
• Clock: With a calendar function
  Accuracy: ±5 ppm
  Excludes the delay (of 1 second, maximum) caused when the power is turned on.
• Time difference between units: ±2 ms max. (time difference between a sub unit and main unit)

• Time setting: Using Web operation, communication commands, event action, or SNTP client function
• Time adjustment method:
  Limit in which the time is gradually adjusted: Select from the available settings between 5 s and 15 s.
  Whether to change an out-of-limit operation immediately or report it as an error can be selected.
  While memory sampling:
    Corrects the time by 1 ms for each second.
    While memory is stopped:
      Immediately change the time.
• Time zone: Sets the time difference from GMT
• Date format: Select "YYYY/MM/DD", "MM/DD/YYYY", "DD/MM/YYYY" or "DD.MM.YYYY".
  MM expression can be selected from the numeric character or ellipse. Ex. January: 01 or Jan
  The delimiter can be selected from ",", ",", "-"

Ethernet Communication Function
• Electrical specifications: Conforms to IEEE 802.3
• Connection: Ethernet (10BASE-T/100BASE-TX)
• Max. segment length: 100 m
• Max. connecting configuration:
  Cascade Max. 4 level (10BASE-T), Max. 2 level (100BASE-TX)
• Connector: RJ-45
• Protocols: TCP, UDP, IP, ICMP, ARP, DHCP, HTTP, FTP, SMTP, SNTP, Modbus, dedicated protocols, and DARWIN compatible communication
• E-mail client: Automatically sends e-mail at specified times
  E-mail is sent by events as below.
  - Alarm occurring/alarm canceling
  - Recover from power failure
  - Report data generating
  - Storage medium error, FTP client function error
  - Specified time period
• Supported authentication methods:
  POP before SMTP, SMTP authentication (Login, Plain, CRAM-MD5)
• FTP client: Automatically transfers data files to the FTP server
  Applicable files: Event data, display data, report data, etc.
• FTP server: Transfers files, delete files, manipulate directories, and outputs file lists
  Max. number of the simultaneous connections: 4
• Web server: GM10 real-time monitoring and setting changes/operations can be performed from a Web browser.
  Max. number of the simultaneous connections: 4
• SNTP client: Inquires the time to the SNTP server and sets the GM10
• SNTP server: Outputs the GM10 time.
  Time resolution: 5 ms
• DHCP client: Automatically obtains the network address settings from the DHCP server
• Modbus client: Reads data from another device and writes to the registers
  (Required /MC option)
**Batch Function**

- **Function:** Data management using batch names. Enter text fields and batch comments in the data file.
- **Batch name:** Added to the file name of the event data and display data.
  - **Structure:** Batch number (up to 32 characters) + lot number (up to 8 digits) + use/not use selectable for lot number, on/off selectable for auto increment function.
  - **Text field:** Adds text to the event data and display data. There are 24 available text fields.
  - **Title:** Up to 20 characters
  - **Text:** Up to 30 characters per field
  - **Batch comment:** Adds text to the event data and display data. 3 comments (max. 50 characters/comments) are available.

**USB Communication Function**

- **Compliant standard:** USB2.0
- **Interface:** Connector: mini B type
- **Number of ports:** 1
- **Power supply:** Self powered
- **Implemented protocol:** Dedicated protocol
- **Communication conditions:** Baud rate: 115200bps, Parity: None, Data length: 8bit, Stop bit: 1bit, Handshake: Off

**FAIL Output Function**

- **Function:** Relay output from a specified channel of the GX90YD or GX90WD when a CPU error occurs
- **Output format:** Relay contact
- **FAIL output:** Relay contact output when any of the various errors is detected
  - Normally energized; de-energized when a system error occurs

**Printer Output Function**

- **Printers:** Supporting the HP PCL5c language and can print through port 9100 on a LAN connection
  - Supports printing using the report template function (/MT).

**SSL Communication Function**

- **Communication:** Sends and receives information encrypted by the SSL (Secure Socket Layer) protocol is possible.
- **Server function:**
  - **Supported servers:** HTTP server and FTP server
  - **Private key:** Can be created on the GM10
  - **Server certificate:** Server certificates created by users can be saved in the internal memory.
  - **Self-signed certificates:** Can be created on the GM10.
- **Client function:**
  - **Supported clients:** FTP client and SMTP client
  - **Trusted certificate:** Trusted certificates (up to 80 KB total) can be saved in the internal memory.

**Electronic Signature Function**

- **Electronic signatures:** Can be added to report files created in PDF format using the PDF form creation function. An electronic signature is provided each time a report file is created.
- **Electronic signature certificate:**
  - Electronic signature certificates created by certificate issuing organizations can be saved in the internal memory.

**Loop Control Function (when a PID control module is installed)**

- **See the GX90UT PID Control Module General Specifications (GS04L53B01-31EN).**

**Other Function**

- **Firmware update function:**
  - The firmware of the GM10 and connected modules can be updated from the GM10.
- **A/D calibration function:**
  - The A/D calibration of connected modules can be operated from the GM10.

**Web Server Function**

- **Real-time data monitoring and setting changes/operations:** Can be performed from a Web browser.
PC System Requirements

**Hardware**

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>Intel Pentium IV, 3GHz or faster x64 or x86 processor</td>
</tr>
<tr>
<td>Internal memory</td>
<td>2 GB or more</td>
</tr>
<tr>
<td>Hard disk</td>
<td>100 MB or more free space, NTFS recommended</td>
</tr>
<tr>
<td>Printer</td>
<td>Printer compatible with the OS</td>
</tr>
<tr>
<td>Mouse</td>
<td>Mouse compatible with the OS</td>
</tr>
<tr>
<td>Display</td>
<td>Display compatible with the OS with 1024x768 dots or better, high color or better</td>
</tr>
<tr>
<td>Communication port</td>
<td>Ethernet port compatible with the OS and TCP/IP protocol</td>
</tr>
</tbody>
</table>

**OS**

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows Vista</td>
<td>Home Premium SP2 (excluding 64-bit editions)</td>
</tr>
<tr>
<td>Windows 7</td>
<td>Home Premium SP1 (32-bit edition and 64-bit editions)</td>
</tr>
<tr>
<td>Windows 8.1</td>
<td>Update (32-bit edition and 64-bit editions)</td>
</tr>
<tr>
<td>Windows 10</td>
<td>Home (32-bit edition and 64-bit editions)</td>
</tr>
</tbody>
</table>

**Compatible Browsers**

Internet Explorer 8, Internet Explorer 9, Internet Explorer 10, Internet Explorer 11, HTTP1.1 and JavaScript are used.

**Software**

Java Runtime Environment 1.8.0_xx (Version 8 Update xx), where xx is 51 or higher

- **Specifications of Options**

  - **Advanced Security Function (IAS)**
    Security and electronic record/signature functions have been added that are compliant with the USA’s FDA title 21 CFR Part 11.
    - Enabling/disabling the advanced security function:
      You can enable or disable the advanced security function.
      * The set values and data stored in the internal memory are initialized each time the function is enabled or disabled.
    - Login function: Using the login function described below, you can enter security settings on the instrument
      User name, password, and user ID (depending on the use/not use setting)
      User level:
      Administrator: No restrictions (all operations)
      User: Operations that can be executed can be set using the authority of user settings.
      Monitor user: Only monitoring and changing passwords are possible.
      Number of users: Up to 100 including administrators, users, and monitor users
      Authority of user: Users can be restricted from performing GM operations.
      Number of authority of user: 10
      Password expiration period: Off, 1 month, 3 months, or 6 months (no expiration period for monitor users)
      Signature restriction: Users can be restricted from signing measurement data files.
      Number of signature restrictions: 8
      * Password control function: Logins are verified by a Kerberos v5 authentication server* (only user name and password)
      Encryption method:
      AES128-CTS-HMAC-SHA1-96
      AES256-CTS-HMAC-SHA1-96
      ARCFOUR-HMAC-MD5
      Pre-Auth function: use
      * The function has confirmed compatibility with Windows Server2003 SP2/Windows Server2008 SP2/Windows Server2012 ActiveDirectory
    - Audit trail function: The history of operations from when the recording was stopped the previous time to when the recording was stopped this time is recorded as event log and saved in measurement data files along with the settings.
    - Data anti-tamper function: Settings and measured data are saved as encrypted binary files.
    - Data type: Only for display or event
      Trigger mode is not possible with event data.
    - Signature function*: Includes approval information to measurement data.
    - Information that can be included: User name, pass/fail, comment
    - Number of signatures: Up to 3 per file
    - Signature privileges: Can be set for each user
      * Universal Viewer is used to sign measurement data.
      Signing measurement data files is not possible from the GM10.
    - Measurement mode limitations: Measurement modes High speed and Dual interval cannot be used.
    - Module limitations: PID control modules cannot be used.

  - **Serial Communication Interface (IC3)**
    - Connection: EIA RS-422/485
    - Protocol: Dedicated protocol, Modbus/RTU, or DARWIN compatible communication
    - Setting/measurement server function:
      Operation, setting or output of measurement data are available by dedicated protocol.
    - Synchronization: Start-stop synchronization
    - Transmission mode (RS-422/485):
      RS-422: Four-wire half-duplex multi-drop connection (1:n (n = 1 to 31))
      RS-485: Two-wire half-duplex multi-drop connection (1:n (n = 1 to 31))
    - Baud rate: 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200 bps
• Data length: 7 or 8 bits
• Start bit: 1 bit
• Stop bit: 1 bit or 2 bit
• Parity: ODD, EVEN, or NONE
• Communication distance:
  - 1200 m (37600 bps or less), 600 m (115200 bps)
• Modbus/RTU communication:
  - Reading or writing of measurement data on other instruments is available by Modbus protocol.
  - Communication channel function (MC option) is needed to read measurement data from other instruments.
• Modbus operation modes: Master or slave

Bluetooth Communication Function (C8)*

Data monitoring, setting, and operation is possible on a tablet, such as a Bluetooth compatible PC or smartphone, through Bluetooth communication.

• Compliant standard: Bluetooth Ver 2.1+EDR
• Operations:
  - Expression: Up to 120 characters
  - Password request function: Requests connected terminals for passwords
• Pairing:
  - Maximum number of connections 8 (multi pairing)
  - Overwritten through FIFO when 8 units are exceeded
  - Displays the 6-digit SSP (Secure Simple Pairing) authentication code and checks for a match (numeric comparison)
• Password request function: Requests connected terminals for passwords
  * Regions in which Bluetooth can be used are restricted by the Radio Waves Act of each country. For details, contact the appropriate authority.

Mathematical Functions with Report Function (MT)

Mathematical Function:
• Number of math channels: GM10-1: 100, GM10-2: 200
  Note: There is a limitation on the number of math channels when the scan interval is shorter than 100 ms.
  See “Restrictions and Cautions” on page 27.
• Scan interval

<table>
<thead>
<tr>
<th>Measurement mode</th>
<th>Scan interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Scan interval</td>
</tr>
<tr>
<td>High speed</td>
<td>Scan interval</td>
</tr>
<tr>
<td>Dual scan interval</td>
<td>Master scan interval</td>
</tr>
</tbody>
</table>

• Expression: Up to 120 characters
• Operations:
  - General arithmetic operations: Four arithmetic operations (+, -, *, /), square root, absolute, common logarithm, natural logarithm, exponential, and power
  - Relational operations: <, ≤, >, ≥, =, and ≠ (115200 bps)
  - Logic operations: AND, OR, NOT, and XOR

<table>
<thead>
<tr>
<th>Measurement mode</th>
<th>Scan interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Scan interval</td>
</tr>
<tr>
<td>High speed</td>
<td>Scan interval</td>
</tr>
<tr>
<td>Dual scan interval</td>
<td>Scan interval of each group</td>
</tr>
</tbody>
</table>

Statistical operations: TLOG (maximum, minimum, average, sum, P-P values of time series data), CLOG (maximum, minimum, average, sum, P-P values of a specified channel)

Special operations: PRE, HOLD, RESET, CARRY

Conditional operation: [a?b:c]

Bit operation: BIT

Integer extracting operation: INT

Remainder extracting operation: MOD

Trigonometric functions: SIN, COS

CP calculation: CP.O2, CP.CO2

Special CLOG.AVE calculation: CLOG.PAVE

• Computation accuracy:
  - Double-precision floating point
• Data that can be used

Channel data:
- Measurement channels: 0001 to 6516
- Math channels: A001 to A100 (GM10-1), A001 to A200 (GM10-2)
- Communication channels:
  - C001 to C300 (GM10-1), C001 to C500 (GM10-2)
  - Communication channel raw data:
  - RC001 to RC300 (GM10-1), RC001 to RC500 (GM10-2)
- Constants: K001 to K100
  - Variable constant: W001 to W100
  - Internal switches: S001 to S100
  - Flags: F01 to F20
  - Recording state: REC01
  - Integer data: Z000 to Z999

Logic math function:
- A function that outputs calculated results as 0 or 1 to DOs or internal switches
  - Number of logic maths: 50
  - Math interval: Fastest 100 ms
  - Expression: Up to 120 characters
  - Math type: Basic arithmetic, relational, logical, conditional, bit
  - Data that can be used: All channel data
  - Logic math:
  - LM001 to LM050
  - Output destination: Internal switches, DO channels (only when set to Manual)
  - Setting change: Cannot be changed during recording

Report function:
- Report at each scheduled time of report.
  - Number of report channels: 60
  - Target: Measurement (input/output module)/math/communication channels
  - Note: There is a limitation on the number of report channels when the scan interval is shorter than 100 ms.
  - See “Restrictions and Cautions” on page 27.

<table>
<thead>
<tr>
<th>Measurement mode</th>
<th>Scan interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Scan interval</td>
</tr>
<tr>
<td>High speed</td>
<td>Scan interval</td>
</tr>
<tr>
<td>Dual scan interval</td>
<td>Scan interval of each group</td>
</tr>
</tbody>
</table>

• Report types: Hourly, daily, daily + weekly, daily + monthly, batch, day custom
• Computation types: Average, maximum, minimum, sum, instantaneous value
  - Unit of sum: OFF, /s, /min, /hour, /day
**Communication Channel Function (IMC)**

Data of external devices, such as PLC and PC, can be displayed and recorded.

- **Number of communication channels:**
  - GM10-1: 300 (C001 to C300)
  - GM10-2: 500 (C001 to C500)

  *Note: There is a limitation on the number of communication channels when the scan interval is shorter than 100 ms. See “Restrictions and Cautions” on page 27.*

  *The minimum communication channel update interval is 100 ms.*

- **Scan interval**

<table>
<thead>
<tr>
<th>Measurement mode</th>
<th>Scan interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Scan interval</td>
</tr>
<tr>
<td>High speed</td>
<td>Scan interval</td>
</tr>
<tr>
<td>Dual interval</td>
<td>Master scan interval</td>
</tr>
</tbody>
</table>

- **Calibration correction:**
  - **Mode:** Linearizer approximation, linearizer bias, correction coefficient
  - **Number of set points:** 2 to 12
  - *Only when the /AH option is installed*

**Log Scale (LG)**

A logarithmic voltage that has been converted from a physical value is applied to the GM10, and then the GM10’s Log scale (logarithmic scale) is used to display and record the physical value.

- **Input type:** Log input (logarithmic input), pseudo log input (input that supports pseudo logs), log linear input (input that is linear on a logarithmic scale)

- **Range:**
  - Log input: 1.00E-15 to 1.00E+15
  - (15 decades maximum)

  | Scale_L < Scale_U
  |------------------|
  | If the lower limit mantissa is 1.00, the difference between the exponents must be 1 or more. If the lower limit mantissa is a value other than 1.00, the difference between the exponents must be 2 or more.

  | Pseudo Log Input/Log linear input
  |------------------|
  | 1.00E-15 to 1.00E+15 (15 decades maximum)

  The upper limit mantissa is the same as the lower limit mantissa.

  If the lower limit mantissa is 1.00, the value must be between 1.00E–15 and 1.00E+15, the difference between the exponents must be 1 or more, and the maximum decades is 15. If the lower limit mantissa is a value other than 1.00, the value must be between 1.01E–15 and 9.99E+14, the difference between the exponents must be 1 or more and the maximum decades is 15.

  **Alarm type:** High limit, low limit, delay high limit, delay low limit

  **Alarm setting range:** The range converted into the LOG scale corresponding to -5% to 105% of the span width.

  **Alarm hysteresis:** Fixed to 0

  **Green band setting range:** The lower limit to the upper limit of the scale. However, the lower limit of the display position must be smaller than the upper limit.

  **Decimal place:** 1 or 2

  **Misc:** Nonlinear input is possible by correcting the input value.

**EtherNet/IP Communication (PLC communication protocol) (E1)**

Can join an Ethernet/IP network as an adapter (or a server)

- **Loading data from the I/O channel or math channel (IMT)**
  - I/O channel: GM10-1: 100, GM10-2: 500
  - Math channel: GM10-1: 100, GM10-2: 200

- **Loading and writing data from/to the communication channel (IMC)**
  - Communication channel:
    - GM10-1: 300, GM10-2:500
  - **Implementation level:** Level 2
  - **Number of the simultaneous connection:** Max. 10
    - (Explicit message)
  - **Supported protocols:** EIP/PCCC, EIP/native

**WT Communication (E2)**

Acquires data by connecting to WT equipment manufactured by Yokogawa Meters & Instruments Corp. via Ethernet communication.

- **Supported models:** WT1800, WT500, WT300
- **Number of connectable units:** 16
- **Communication cycle:** 500 ms/1 s/2 s/5 s/10 s/20 s/30 s
- **Types of data that can be obtained:** Voltage, current, power, power factor, phase, electrical energy, high-frequency wave, etc.
- **Number of data allocations:** 300

**Multi-batch Function (BT)**

Recording start/stop and data file creation is possible for each batch.

- **Number of multi batches**
- **Batch single operation:** Memory start/stop, math reset, message writing
- **Batch overview operation:** Computation start/stop, report start/stop, manual sampling, setup data save/load
- **Scan interval:** 500 ms, 1 s, 2 s, 5 s
  - (common to all batches)
- **Data type:** Display or event only Trigger mode not available for event data.
- **Recording interval:** Common to all batches
- **Data file:** Display or event data file created for each batch

- **Number of display groups:**
  - GM10-1: 6 max. per batch
  - GM10-2: 12 max. per batch

- **Number of channels per group:**
  - 20

- **Channels assigned to the display group of each batch and those set as recording channels are recorded to data files**

  - **Batch single settings:** Group, trip line, file header, data file name, text field, batch number, lot number
• Measurement mode limitations: Measurement modes High speed and Dual interval cannot be used.

Aerospace Heat Treatment (/AH)
Supports heat treatment application AMS2750/ NADCAP
Schedule management for periodically executing calibration correction configuration and the like
In correction coefficient mode of calibration correction, two biases can be specified: one based on thermocouple and another based on device
• Number of manageable schedules
  GM10-1: 6 max., GM10-2: 12 max.
• Calibration correction mode: Off, linearizer approximation, linearizer bias, correction coefficient
Number of set points: 2 to 12

OPC-UA Server (/E3)
Data acquired by the GM can be accessed through Ethernet communication from a host system (OPC-UA client).
• Communication
  Type: OPC-UA Server
  Encoding: UA Binary
  Protocol: OPC UA TCP
• Maximum number of connections: 3 sessions
• Security
  Mode: None
  Encryption: None
  Login: Anonymous, Username
• Data acquisition:
  Measurement value, alarm status, alarm value
  Computation value, alarm status, alarm value
  Communication value, alarm status, alarm value
  Batch information
• Data writing:
  Measurement channel (DO channel only), communication channel, alarm value, batch information
• Other acquired information:
  Device name, serial number, time, device status
• Port number: 4840 (changeable: 1 to 65535)
• Number of items: 300 max. (MonitoredItem/Session)
• Fastest period: 100 ms
• Service set:
  Discovery: FindServers, GetEndpoints
  SecureChannel: OpenSecureChannel, CloseSecureChannel
  Session: CreateSession, ActivateSession, CloseSession
  View: Browse, BrowseNext, TranslateBrowsePathsToNodeIds
  Attribute: Read, Write
  MonitoredItem: CreateMonitoredItems, ModifyMonitoredItems, DeleteMonitoredItems, SetMonitoringMode
  Subscription: CreateSubscription, ModifySubscription, DeleteSubscriptions, Publish, Republish, SetPublishingMode

SLMP Communication (Mitsubishi PLC) (/E4)
Protocol function of CC-Link family that enables connection from GM to Mitsubishi Electric PLC without sequencer program.
The GM operates as an SLMP client. Writing GM measurement data to a PLC and reading PLC data into communication channels* are possible.
  • The communication channel function (MC option) is required.
• Number of connection destination servers: 16 max.
• Read cycle: 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s, 20 s, 30 s, 1 min
• Number of commands that can be registered:
  GM10-1: 100
  GM10-2: 200
• Communicable internal data:
  Special relay (SM), special register (SD), input (X), output (Y), internal relay (M), latch relay (L), annunciator (F), edge relay (V), link relay (B), data register (D), link register (W), timer contact (TS), timer coil (TC), current timer value (TN), integration timer contact (SS), integration timer coil (SC), current integration timer value (SN), counter contact (CS), counter coil (CC), current counter value (CN), special link relay (SB), special link register (SW), direct access input (DX), direct access output (DY), index register (Z), file register (R, ZR), extended data register (D), extended link register (W)
  Device code is indicated in parentheses.

Program Control Function (/PG)
See the PID Control Module General Specifications (GS 04L51B31-01EN).

Integration Bar Graph Function (/WH)
The integration bar graph function reads the report file (a hourly report or hourly report / daily report) stored on the SD card of GM 10 and displays the integration bar graph and the integration trend in the web application.
• Report file monitoring and display update interval: 5 minutes
  • When a PID control module is installed, loop objects are displayed in place of channel objects.
    Data collection: PV, SP, OUT, R/S, A/M/C, R/L, alarm status in loops
    Data saving: OUT, R/S, A/M/C, R/L
## GM10 HARDWARE SPECIFICATIONS

- **Material:** Polycarbonate
- **Color:**
  - Case: Smoke blue (Munsell 4.1PB 6.0/4.5 equivalent)
  - Front panel: Light charcoal gray (Munsell 10B 3.6/0.3 equivalent)
- **External Dimensions:** 45.1(W)×111(H)×107.1(D) mm
- **Weight:** Approx. 0.25 kg

### Power Supply and Isolation

- **Power supply:** Supplied from the GM90PS Power Supply Module
- **Power consumption:** 2.8 W maximum
- **Insulation resistance:** Between RS-422/485 terminal and internal circuit and between Ethernet terminal and internal circuit, 20 MΩ or higher at 500 V DC
- **Isolation diagram**

![Isolation diagram](image)

- **Circuits delimited by lines are mutually isolated.**

### Other Specifications

- **Memory backup:** A built-in lithium battery backs up the settings and runs the clock.

### External Dimensions

![External Dimensions](image)

<table>
<thead>
<tr>
<th>Unit: mm [approx. inch]</th>
</tr>
</thead>
<tbody>
<tr>
<td>107.1 [4.22]</td>
</tr>
<tr>
<td>117.1 [4.61]</td>
</tr>
<tr>
<td>3 [0.12]</td>
</tr>
<tr>
<td>2 [0.08]</td>
</tr>
<tr>
<td>3.94 [0.15]</td>
</tr>
<tr>
<td>0.31 [0.01]</td>
</tr>
<tr>
<td>100 [3.94]</td>
</tr>
<tr>
<td>45.1 [1.77]</td>
</tr>
<tr>
<td>42.5 [1.67]</td>
</tr>
</tbody>
</table>

## GM90MB MODULE BASE SPECIFICATIONS

- **Number of installable modules:** 1
- **Power consumption:** Less than 0.01 W
- **Automatic module number assignment function:** Automatically assigns a module number when a module is connected
- **Material:** Polycarbonate
- **Color:** Smoke blue (Munsell 4.1PB 6.0/4.5 equivalent)
- **External Dimensions:** 57.7(W)×135(H)×103.5(D) mm
- **Weight:** Approx. 0.15 kg

### External Dimensions

![External Dimensions](image)

<table>
<thead>
<tr>
<th>Unit: mm [approx. inch]</th>
</tr>
</thead>
<tbody>
<tr>
<td>103.5 [4.07]</td>
</tr>
<tr>
<td>106.8 [4.20]</td>
</tr>
<tr>
<td>135 [5.31]</td>
</tr>
<tr>
<td>38.5 [1.52]</td>
</tr>
<tr>
<td>18.8 [0.74]</td>
</tr>
<tr>
<td>9.5 [0.37]</td>
</tr>
<tr>
<td>2 [0.08]</td>
</tr>
<tr>
<td>5.9 [0.23]</td>
</tr>
<tr>
<td>9.5 [0.37]</td>
</tr>
<tr>
<td>135 [5.31]</td>
</tr>
<tr>
<td>38.5 [1.52]</td>
</tr>
<tr>
<td>18.8 [0.74]</td>
</tr>
<tr>
<td>9.5 [0.37]</td>
</tr>
<tr>
<td>2 [0.08]</td>
</tr>
<tr>
<td>5.9 [0.23]</td>
</tr>
<tr>
<td>9.5 [0.37]</td>
</tr>
<tr>
<td>135 [5.31]</td>
</tr>
<tr>
<td>38.5 [1.52]</td>
</tr>
<tr>
<td>18.8 [0.74]</td>
</tr>
<tr>
<td>9.5 [0.37]</td>
</tr>
<tr>
<td>2 [0.08]</td>
</tr>
<tr>
<td>5.9 [0.23]</td>
</tr>
<tr>
<td>9.5 [0.37]</td>
</tr>
<tr>
<td>135 [5.31]</td>
</tr>
<tr>
<td>38.5 [1.52]</td>
</tr>
<tr>
<td>18.8 [0.74]</td>
</tr>
<tr>
<td>9.5 [0.37]</td>
</tr>
<tr>
<td>2 [0.08]</td>
</tr>
<tr>
<td>5.9 [0.23]</td>
</tr>
<tr>
<td>9.5 [0.37]</td>
</tr>
<tr>
<td>135 [5.31]</td>
</tr>
<tr>
<td>38.5 [1.52]</td>
</tr>
<tr>
<td>18.8 [0.74]</td>
</tr>
<tr>
<td>9.5 [0.37]</td>
</tr>
<tr>
<td>2 [0.08]</td>
</tr>
<tr>
<td>5.9 [0.23]</td>
</tr>
<tr>
<td>9.5 [0.37]</td>
</tr>
<tr>
<td>135 [5.31]</td>
</tr>
<tr>
<td>38.5 [1.52]</td>
</tr>
<tr>
<td>18.8 [0.74]</td>
</tr>
<tr>
<td>9.5 [0.37]</td>
</tr>
<tr>
<td>2 [0.08]</td>
</tr>
<tr>
<td>5.9 [0.23]</td>
</tr>
<tr>
<td>9.5 [0.37]</td>
</tr>
<tr>
<td>135 [5.31]</td>
</tr>
<tr>
<td>38.5 [1.52]</td>
</tr>
<tr>
<td>18.8 [0.74]</td>
</tr>
<tr>
<td>9.5 [0.37]</td>
</tr>
<tr>
<td>2 [0.08]</td>
</tr>
<tr>
<td>5.9 [0.23]</td>
</tr>
<tr>
<td>9.5 [0.37]</td>
</tr>
<tr>
<td>135 [5.31]</td>
</tr>
<tr>
<td>38.5 [1.52]</td>
</tr>
<tr>
<td>18.8 [0.74]</td>
</tr>
<tr>
<td>9.5 [0.37]</td>
</tr>
<tr>
<td>2 [0.08]</td>
</tr>
<tr>
<td>5.9 [0.23]</td>
</tr>
<tr>
<td>9.5 [0.37]</td>
</tr>
<tr>
<td>135 [5.31]</td>
</tr>
<tr>
<td>38.5 [1.52]</td>
</tr>
<tr>
<td>18.8 [0.74]</td>
</tr>
<tr>
<td>9.5 [0.37]</td>
</tr>
<tr>
<td>2 [0.08]</td>
</tr>
<tr>
<td>5.9 [0.23]</td>
</tr>
<tr>
<td>9.5 [0.37]</td>
</tr>
<tr>
<td>135 [5.31]</td>
</tr>
<tr>
<td>38.5 [1.52]</td>
</tr>
<tr>
<td>18.8 [0.74]</td>
</tr>
<tr>
<td>9.5 [0.37]</td>
</tr>
</tbody>
</table>
GM90PS POWER SUPPLY MODULE
SPECIFICATIONS

Unit: mm

With a power inlet

With power supply terminals (M4)

Power switch

GM90PS-1N1W0

• Rated supply voltage: 100 to 240 V AC
• Allowable supply voltage: 90 to 264 V AC
• Power frequency: 50 Hz ± 2%, 60 Hz ± 2%
• Power switch: Available
• Terminal type: Inlet or M4 screw terminal
• Allowable interruption time: Less than 1 cycle of the power supply frequency
• Insulation resistance: Between the power supply terminal and earth: 20 MΩ or higher at 500 V DC
• Withstand voltage: Between the power supply terminal and earth: 3000 V AC (50/60 Hz) for 1 minute
• Grounding: Be sure to set a low grounding resistance.
• Material: Polycarbonate
• Color: Smoke blue (Munsell 4.1PB 6.0/4.5 equivalent)
• External Dimensions: 56.8(W)×135(H)×107.1(D) mm
• Weight: Approx. 0.55kg

GM90PS-1N2W0

• Rated supply voltage: 12 to 28 V DC
• Allowable supply voltage: 10 to 32 V DC
• Power frequency: 50 Hz ± 2%, 60 Hz ± 2%
• Power switch: Available
• Terminal type: M4 screw terminal
• Allowable interruption time: 2 ms or less
• Insulation resistance: Between the power supply terminal and earth: 20 MΩ or higher at 500 V DC
• Withstand voltage: Between the power supply terminal and earth: 1000 V AC (50/60 Hz) for 1 minute
• Grounding: Be sure to set a low grounding resistance.
• Material: Polycarbonate
• Color: Smoke blue (Munsell 4.1PB 6.0/4.5 equivalent)
• External Dimensions: 56.8(W)×135(H)×107.1(D) mm
• Weight: Approx. 0.55kg
- External Dimensions

Unit: mm [approx. inch]

With a power inlet

With power supply terminals (M4)

Rear view

When the latch is lowered

Rear view
UNIT EXTERNAL DIMENSIONS

Unit: mm [approx. inch]

- **Main unit (single unit)**

- **Main unit (multi unit)**

- **Sub unit**

<table>
<thead>
<tr>
<th>Unit types</th>
<th>Maximum width for each input / output module to be connected: L (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Main unit (single unit)</td>
<td>138</td>
</tr>
<tr>
<td>Main unit (multi unit)</td>
<td>188</td>
</tr>
<tr>
<td>7.40</td>
<td>9.37</td>
</tr>
<tr>
<td>Sub unit (multi unit)</td>
<td>138</td>
</tr>
<tr>
<td>5.43</td>
<td>7.40</td>
</tr>
</tbody>
</table>

All Rights Reserved. Copyright © 2014, Yokogawa Electric Corporation

GS 04L55B01-01EN Oct 17, 2018-00
- Vertical Mounting Dimensions for DIN Rail Mounting

Unit: mm [approx. inch]

- Wall Mount Dimensions

Unit: mm [approx. inch]

Tolerance: ±0.3 [±0.012]
# APPLICATION SOFTWARE

SMARTDAC+ STANDARD
- Universal Viewer
- Hardware Configurator
- IP Address Configurator

Download the latest version of the software from the following URL.
www.smartdacplus.com/software/en/

## PC System Requirements

### Operating system:

<table>
<thead>
<tr>
<th>OS</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows Vista</td>
<td>Home Premium SP2 (excluding 64-bit editions)</td>
</tr>
<tr>
<td></td>
<td>Business Edition SP2 (excluding 64-bit editions)</td>
</tr>
<tr>
<td>Windows 7</td>
<td>Home Premium SP1 (32- or 64-bit edition)</td>
</tr>
<tr>
<td></td>
<td>Professional SP1 (32- or 64-bit edition)</td>
</tr>
<tr>
<td>Windows 8.1</td>
<td>Update (32- or 64-bit edition)</td>
</tr>
<tr>
<td></td>
<td>Pro Update (32- or 64-bit edition)</td>
</tr>
<tr>
<td>Windows 10</td>
<td>Home (32- or 64-bit edition)</td>
</tr>
<tr>
<td></td>
<td>Pro (32- or 64-bit edition)</td>
</tr>
</tbody>
</table>

### Processor and main memory:

<table>
<thead>
<tr>
<th>OS</th>
<th>Processor and main memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows Vista</td>
<td>Intel Pentium 4, 3 GHz or faster x64 or x86 processor. At least 2 GB.</td>
</tr>
<tr>
<td>Windows 7</td>
<td>32-bit edition: Intel Pentium 4, 3 GHz or faster x64 or x86 processor. At least 2 GB.</td>
</tr>
<tr>
<td>Windows 8.1</td>
<td>64-bit edition: Intel Pentium 4, 3 GHz or faster x64 processor. At least 2 GB.</td>
</tr>
<tr>
<td>Windows 10</td>
<td></td>
</tr>
</tbody>
</table>

### Web browser:

- Supported browser: Windows Internet Explorer
- Version: Internet Explorer 11
- HTTP1.1 and JavaScript are used.

### Hard disk:

- 100MB or more of free space (depending on the amount of data, you may need more memory).

### Display:

- A video card that is recommended for the OS and a display that is supported by the OS, has a resolution of 1024 x 768 or higher, and that can show 65,536 colors (16-bit, high color) or more.

## Universal Viewer

The universal viewer can display the following data generated by data loggers or recorders on the screen and print it out on the printer.

- Display data file
- Event data file
- Report data file
- Manual sampled data file

## Hardware Configurator

- Offline setting on Web browser

  Settings can be configured from Internet Explorer 8, 9, 10, and 11.

## IP Address Configurator

- GM10 IP address assignment

  Edit the GM10’s host name, IP address, DNS server, domain name, domain suffix, and so on as well as register the host name to a DNS server.

- GM10 search

  Search for GMs in the same network segment and list them.
## MODEL AND SUFFIX CODES

### GM10 Model and Suffix Codes

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Optional code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM10</td>
<td>-1</td>
<td></td>
<td>Data Acquisition Module for SMARTDAC+ GM</td>
</tr>
<tr>
<td></td>
<td>-2</td>
<td></td>
<td>Large memory (Max. measurement channels: 500)</td>
</tr>
<tr>
<td>Area</td>
<td>E</td>
<td>0</td>
<td>General</td>
</tr>
</tbody>
</table>

#### Optional features

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/AH</td>
<td>Aerospace heat treatment</td>
</tr>
<tr>
<td>/AS</td>
<td>Advanced security function *5</td>
</tr>
<tr>
<td>/BT</td>
<td>Multi-batch function *4</td>
</tr>
<tr>
<td>/C3</td>
<td>RS-422/485</td>
</tr>
<tr>
<td>/C8</td>
<td>Bluetooth</td>
</tr>
<tr>
<td>/E1</td>
<td>EtherNet/IP communication (PLC communication protocol) *7</td>
</tr>
<tr>
<td>/E2</td>
<td>WT communication</td>
</tr>
<tr>
<td>/E3</td>
<td>OPC-UA server</td>
</tr>
<tr>
<td>/E4</td>
<td>SLMP communication (Mitsubishi PLC) *8</td>
</tr>
<tr>
<td>/E5</td>
<td>Log scale</td>
</tr>
<tr>
<td>/IC</td>
<td>Communication channel function *9</td>
</tr>
<tr>
<td>/MT</td>
<td>Mathematical function (with report function) *2,3</td>
</tr>
<tr>
<td>/PG</td>
<td>Program control function *6</td>
</tr>
<tr>
<td>/WH</td>
<td>Integration bar graph function *10</td>
</tr>
</tbody>
</table>

### GM90PS Model and Suffix Codes

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix Code</th>
<th>Optional code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM90PS</td>
<td>-1</td>
<td></td>
<td>Power Supply Module for SMARTDAC+ GM</td>
</tr>
<tr>
<td>Type</td>
<td>-1</td>
<td></td>
<td>Always –1</td>
</tr>
<tr>
<td>Area</td>
<td>N</td>
<td></td>
<td>General</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>1</td>
<td>100-240 V AC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>12-28 V DC</td>
<td></td>
</tr>
<tr>
<td>Power supply connection</td>
<td>D</td>
<td>Power inlet with UL/CSA cable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>Power inlet with VDE cable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>H</td>
<td>Power inlet with GB cable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>Power inlet with NBR cable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q</td>
<td>Power inlet with BS cable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>Power inlet with AS cable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W</td>
<td>Screw terminal (M4) (without power cable)</td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>E</td>
<td>0</td>
<td>General</td>
</tr>
</tbody>
</table>

#### Optional features

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/WH</td>
<td>For Integration bar graph function</td>
</tr>
</tbody>
</table>

*1 If you specify WT communication, you must also specify the communication channel function (/MC option).
*2 Optional code /MT (MATH) required if using the GX90XD’s or GX90WD’s pulse input.
*3 Optional code /MT (MATH) required if using the GX90XP’s pulse integration.
*4 When the advanced security function is set to ON, the scan interval is set to 100 ms or longer. In addition, the dual interval function and PID modules cannot be used.
*5 When the multi-batch function is set to ON, the scan interval is set to 500 ms or longer. In addition, the dual interval function cannot be used.
*6 A PID control module is required to use the program control function.
*7 If you want to write from a PLC to the GM via EtherNet/IP communication, a separate communication channel (/MC) is required.
*8 A separate communication channel (/MC) is required to perform SLMP communication.
*9 A communication channel (/MC) is required to configure the Modbus client function and for other devices to write to the GM Modbus server.
*10 If you specify WH option, you must also specify the communication channel function (/MC option) and the mathematical function (/MT option).

### GM90MB Model and Suffix Codes

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM90MB</td>
<td>-01</td>
<td>Module Base for SMARTDAC+ GM</td>
</tr>
<tr>
<td>Area</td>
<td>N</td>
<td>General</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>Always zero</td>
</tr>
</tbody>
</table>

## ORDERING INFORMATION

Model, suffix code, and optional codes, when necessary, are required to be specified.

Note 1: For modules other than GM90PS (power supply module), a GM90MB (module base) is required for each module.
Note 2: Before ordering, read “MODEL SELECTION GUIDE” on page 24 and “Restrictions and Cautions” on page 26.

## STANDARD ACCESSORIES

<table>
<thead>
<tr>
<th>Model</th>
<th>Standard accessory name</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM10</td>
<td>SD card (1 GB)</td>
<td>1</td>
</tr>
<tr>
<td>GM90PS</td>
<td>Connector cover</td>
<td>1</td>
</tr>
<tr>
<td>GM90MB</td>
<td>Interconnect screw (M3)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Power cable (depends on the suffix code of the power supply connection)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Interconnect screw (M3)</td>
<td>4</td>
</tr>
</tbody>
</table>
## OPTIONAL ACCESSORIES (SOLD SEPARATELY)

<table>
<thead>
<tr>
<th>Product</th>
<th>Model/part no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD card (1 GB)</td>
<td>773001</td>
</tr>
<tr>
<td>Shunt resistor for M3 terminal (250 Ω ± 0.1 %)</td>
<td>415940</td>
</tr>
<tr>
<td>Shunt resistor for M3 terminal (100 Ω ± 0.1 %)</td>
<td>415941</td>
</tr>
<tr>
<td>Shunt resistor for M3 terminal (10 Ω ± 0.1 %)</td>
<td>415942</td>
</tr>
<tr>
<td>Shunt resistor for clamp terminal (250 Ω ± 0.1 %)</td>
<td>438920</td>
</tr>
<tr>
<td>Shunt resistor for clamp terminal (100 Ω ± 0.1 %)</td>
<td>438921</td>
</tr>
<tr>
<td>Shunt resistor for clamp terminal (10 Ω ± 0.1 %)</td>
<td>438922</td>
</tr>
<tr>
<td>Dummy cover</td>
<td>B8740CZ</td>
</tr>
<tr>
<td>Validation Documents (For /AS option) *1</td>
<td>773230</td>
</tr>
</tbody>
</table>

*1 Provision of Validation Documents A license sheet containing the license key required for installation is provided. Download the validation document from the following URL: http://www.smartdacplus.com/software/en/

### Related Product (Sold Separately)

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA10</td>
<td>Data Logging Software</td>
</tr>
</tbody>
</table>

### Test Certificate (QIC, sold separately)

QIC is available for each model.

### User’s Manual

Product user’s manuals can be downloaded from the following URL. You will need Adobe Reader 7 or later by Adobe Systems.

## MODEL SELECTION GUIDE

### Selection of the system configuration and GM10 type

<table>
<thead>
<tr>
<th>Model-Type</th>
<th>Internal memory</th>
<th>System Configuration</th>
<th>I/O channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM10-1</td>
<td>500MB</td>
<td>Single Unit</td>
<td>0 to 100ch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Multi Unit</td>
<td>0 to 100ch</td>
</tr>
<tr>
<td>GM10-2</td>
<td>1.2GB</td>
<td>Single Unit</td>
<td>0 to 100ch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Multi Unit</td>
<td>0 to 420ch</td>
</tr>
</tbody>
</table>

### I/O Modules

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Product name</th>
<th>Description</th>
<th>Number of channels</th>
<th>Measurement interval (shortest)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GX90XA</td>
<td>-10-C1N-□N</td>
<td>Analog Input Module</td>
<td>DC current (mA), DC current standard signal (4-20 mA)</td>
<td>10</td>
<td>100 ms</td>
</tr>
<tr>
<td></td>
<td>-10-L1N-□N</td>
<td>DC voltage, standard signal, thermocouple (TC), DI (voltage, contact), and DC current (by adding an external shunt resistor)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-10-U2N-□N</td>
<td>DC voltage, standard signal, thermocouple (TC), DI (voltage, contact), and DC current (by adding an external shunt resistor)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-10-T1N-□N</td>
<td>DC voltage, standard signal, thermocouple (TC), DI (voltage, contact), and DC current (by adding an external shunt resistor)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-10-V1N-□N</td>
<td>DC voltage, standard signal, thermocouple (TC), DI (voltage, contact), and DC current (by adding an external shunt resistor)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-04-H0N-□N</td>
<td>DC voltage, standard signal, thermocouple, resistance temperature detector (RTD), DI (voltage, contact), DC current (when an external shunt resistor is connected)</td>
<td></td>
<td>4</td>
<td>1 ms</td>
</tr>
<tr>
<td></td>
<td>-06-R1N-□N</td>
<td>4-wire RTD, 4-wire resistance</td>
<td></td>
<td>6</td>
<td>100 ms</td>
</tr>
<tr>
<td>GX90XD</td>
<td>-16-11N-□N</td>
<td>Digital Input Module</td>
<td>Remote control input, pulse input</td>
<td>16</td>
<td>100 ms</td>
</tr>
<tr>
<td>GX90XP</td>
<td>-10-11N-□N</td>
<td>Pulse Input Module</td>
<td>Pulse input (flow sum and the like)</td>
<td>10</td>
<td>100 ms</td>
</tr>
<tr>
<td>GX90YD</td>
<td>-06-11N-3N</td>
<td>Digital Output Module</td>
<td>Alarm output, etc</td>
<td>6</td>
<td>100 ms (update interval)</td>
</tr>
<tr>
<td>GX90WD</td>
<td>-0806-01N-3N</td>
<td>Digital Input/Output Module</td>
<td>Remote control input, pulse input</td>
<td>Di: 8 DO: 6</td>
<td>100 ms</td>
</tr>
<tr>
<td>GX90XP</td>
<td>-10-11N-□N</td>
<td>Pulse Input Module</td>
<td>Pulse input (flow sum and the like)</td>
<td>10</td>
<td>100 ms</td>
</tr>
<tr>
<td>GX90YA</td>
<td>-04-C1N-□N</td>
<td>Analog Output Module</td>
<td>Transmission output, manual output</td>
<td>4</td>
<td>100 ms (update interval)</td>
</tr>
<tr>
<td>GX90UT</td>
<td>-02-11N-3N</td>
<td>PID Control Module</td>
<td>Control of temperature, flow, pressure etc.</td>
<td>2 loops</td>
<td>100 ms (update interval)</td>
</tr>
</tbody>
</table>

### Single unit system configuration (up to 100 channels)

Configuration example (maximum)
- GM10: 1
- GM90PS: 1
- GX90[□□]: 10
- GM90MB: 11

---

GM90MB Module Base

GM90PS Power Supply Module

GM10 Data Acquisition Module

---

All Rights Reserved. Copyright © 2014, Yokogawa Electric Corporation

GS 04L55B01-01EN Oct 17, 2018-00
Multi unit system configuration (up to 420 channels)

Main unit configuration example (maximum)
GM10: 1
GM90PS: 1
GX90EX: 6
GX90EX: 1
GM90MB: 8

Sub unit configuration example (maximum)
GM90PS: 6
GX90EX: 36
GX90EX: 6
GM90MB: 42
RESTRICTIONS AND CAUTIONS

Limit to the number of modules and number of channels in the system

<table>
<thead>
<tr>
<th>System</th>
<th>Measurement mode</th>
<th>Maximum Number of Connections</th>
<th>Maximum Number of Channels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Module</td>
<td>I/O</td>
</tr>
<tr>
<td>GM10-1</td>
<td>Normal</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>High speed</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Dual interval</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>GM10-2</td>
<td>Normal</td>
<td>42</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>High speed</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Dual interval</td>
<td>42</td>
<td>250</td>
</tr>
</tbody>
</table>

Limit to the number of modules per unit

The following table shows the limits when the module specified under Module is connected to the system. The system will not operate if the limit is exceeded.

<table>
<thead>
<tr>
<th>Module</th>
<th>Single unit system</th>
<th>Multi unit system</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Main unit</td>
</tr>
<tr>
<td>When GX90XA-10-T1 is included</td>
<td>8</td>
<td>No limit</td>
</tr>
<tr>
<td>When GX90XA-04-H0 is included</td>
<td>8</td>
<td>No limit</td>
</tr>
<tr>
<td>When GX90XA-04-H0 and GX90YA are included</td>
<td>7</td>
<td>No limit</td>
</tr>
<tr>
<td>When GX90UT is included</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

Limit to the Number of Sub Units
- Up to six units can be connected.
- Connection is not possible if the measurement mode is set to High speed.

Limit on Modules
- Up to 10 modules consisting of GX90YD, GX90WD, and GX90UT can be connected to the system.
- One GX90WD module can be connected to each unit.
- Two GX90YA modules can be connected to the main unit and to the sub unit.
- Up to 10 GX90YA modules can be connected to a GM10-1 system and up to 12 to a GM10-2 system.
- If the measurement mode is High speed, a GX90XD or GX90WD module can be connected to the system.
- If the measurement mode is High speed, only GX90XA-04-H0 (high-speed AI), GX90XD (DI), and GX90WD (DIO) are detected.
- DI and DIO are fixed to remote mode. Measurement and recording are not possible.
- If the measurement mode is Dual interval, GX90UT is not detected.
- Up to 10 GX90UT modules can be connected to a GM10-1 system and up to 10 to a GM10-2 system.

Notes on Module Installation
- If you want to use reference junction compensation on a thermocouple input of a GX90XA-10-U2, GX90XA-10-L1, GX90XA-10-T1 or GX90XA-10-V1, do not connect the following module to the right of the GX90XA module as seen from the front. Doing so may cause the reference junction compensation accuracy to deviate from the guaranteed range.
- If the maximum number of I/O channels are assigned and the last channel is assigned to an intermediate channel of a connected I/O module, that module and subsequent modules will not be identified.

GM10-1

![Diagram of module connection]

- If you want to use the DI of a GX90XD or GX90WD, only a single module installed in the GM main unit can be used.
Limit to the Number of Measurement Channels

There is a limit to the number of channels that can measure at scan intervals shorter than 100 ms.

• When the measurement mode is set to High speed.

<table>
<thead>
<tr>
<th>GM10-1</th>
<th>Channel</th>
<th>1 ms</th>
<th>2 ms</th>
<th>5 ms</th>
<th>10 ms</th>
<th>20 ms</th>
<th>50 ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>20</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Math</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>20</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Comm.</td>
<td>3</td>
<td>6</td>
<td>15</td>
<td>30</td>
<td>60</td>
<td>150</td>
<td></td>
</tr>
</tbody>
</table>

| Report | 1      | 2    | 5    | 10   | 20    | 50    |

<table>
<thead>
<tr>
<th>GM10-2</th>
<th>Channel</th>
<th>1 ms</th>
<th>2 ms</th>
<th>5 ms</th>
<th>10 ms</th>
<th>20 ms</th>
<th>50 ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O</td>
<td>5</td>
<td>10</td>
<td>25</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Math</td>
<td>2</td>
<td>4</td>
<td>10</td>
<td>20</td>
<td>40</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Comm.</td>
<td>5</td>
<td>10</td>
<td>25</td>
<td>50</td>
<td>100</td>
<td>250</td>
<td></td>
</tr>
</tbody>
</table>

| Report | 2      | 4    | 10   | 20   | 40    | 60    |

• When the measurement mode is set to Dual interval.

<table>
<thead>
<tr>
<th>GM10-1</th>
<th>Channel</th>
<th>1 ms</th>
<th>2 ms</th>
<th>5 ms</th>
<th>10 ms</th>
<th>20 ms</th>
<th>50 ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>Math</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>Comm.</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
</tbody>
</table>

| Report | -----   | -----| -----| -----| ----- | ----- | ----- |

<table>
<thead>
<tr>
<th>GM10-2</th>
<th>Channel</th>
<th>1 ms</th>
<th>2 ms</th>
<th>5 ms</th>
<th>10 ms</th>
<th>20 ms</th>
<th>50 ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O</td>
<td>5</td>
<td>10</td>
<td>25</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Math</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>20</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Comm.</td>
<td>2</td>
<td>5</td>
<td>12</td>
<td>25</td>
<td>50</td>
<td>125</td>
<td></td>
</tr>
</tbody>
</table>

| Report | 1      | 2    | 5    | 10   | 20    | 30    |

*1 Channels that can be used only on one of the two scan groups. They operate at the scan interval specified in the master scan group.

*2 Can be specified from 30 channels.

Limit to the Number of Recording Channels in Each Measurement Mode

<table>
<thead>
<tr>
<th>System</th>
<th>I/O channel + math channel + communication channel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Measurement mode</td>
</tr>
<tr>
<td>GM10-1</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td>High speed</td>
</tr>
<tr>
<td></td>
<td>Dual interval</td>
</tr>
<tr>
<td>GM10-2</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td>High speed</td>
</tr>
<tr>
<td></td>
<td>Dual interval</td>
</tr>
</tbody>
</table>

Dual Interval Searching of Universal Viewer

<table>
<thead>
<tr>
<th>Recording mode</th>
<th>Link dual interval waveform</th>
<th>Show dual interval waveform integrated link view</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free + Free</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Free + Trigger (single-shot, repeated)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Trigger (single-shot, repeated) + Trigger (single-shot, repeated)</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

*1 Link dual interval waveform: A function that searches a folder for and displays the file that forms a pair with the displayed file.

*2 Show dual interval waveform integrated link view: A function that displays from the result of Search Open one of the files that forms a pair and displays both trends when it is clicked.

Program Pattern Setting (PG option)

Hardware Configurator is required for setting program patterns. You cannot set using the Web application.
Trademarks

The TCP/IP software used in this product and the document for that TCP/IP software are based in part on BSD networking software, Release 1 licensed from The Regents of the University of California.
SMARTDAC+ and SMARTDACPLUS are trademark of Yokogawa Electric Corporation.
Microsoft, MS, and Windows are trademarks or registered trademarks of Microsoft Corporation in the United States and other countries.
Pentium is a registered trademark of Intel Corporation.
Modbus is a registered trademark of Schneider Electric.
Kerberos is a trademark of MIT.
Bluetooth is a trademark or registered trademark of Bluetooth SIG Inc.
Other company names and product names appearing in this document are registered trademarks or trademarks of their respective holders.
The company and product names used in this manual are not accompanied by the registered trademark or trademark symbols (® and ™).